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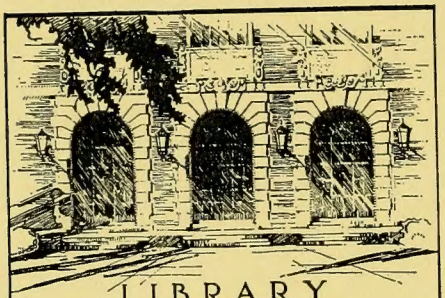

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COST OF BASS FISHING AT RIDGE LAKE, COLES COUNTY, ILLINOIS

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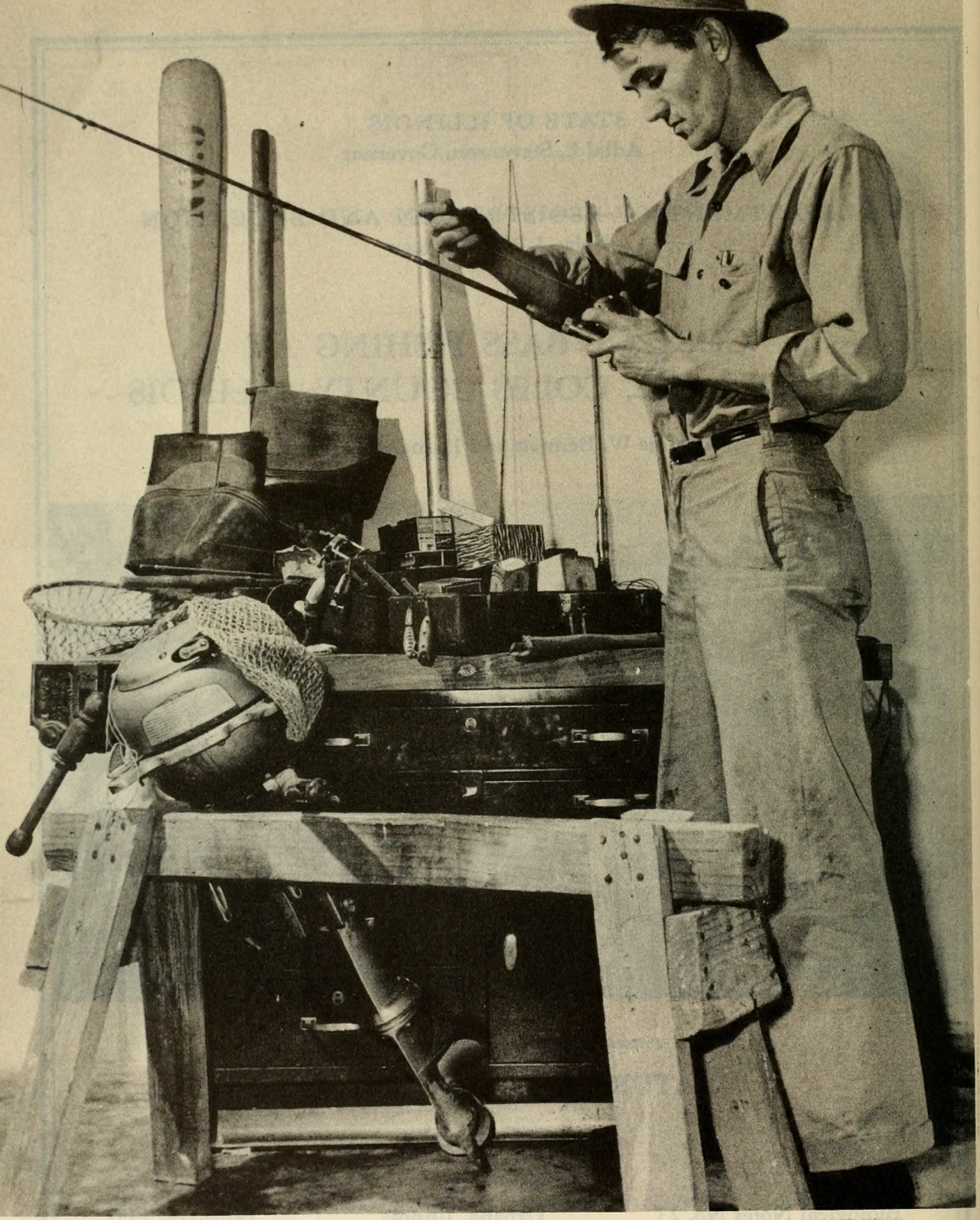

Equipment represents a major item in the cost of fishing in Illinois.

COST OF BASS FISHING AT RIDGE LAKE, COLES COUNTY, ILLINOIS

George W. Bennett
and
Leonard Durham*

More people engage in angling than in any other participation sport in the United States, and the amount of money spent for fishing equipment, travel, and lodging incident to angling is greater than the amount spent in following any other participation sport.

No one questions the intangible value of fishing as a form of recreation, but when intangible values are weighed against values that can be expressed in monetary terms (such as the value of the corn produced on a drained lake bottom) the intangible values usually do not receive due consideration. For this reason it seems justifiable to analyze costs associated with sport fishing, not in an attempt to convert intangible values into monetary terms but rather to illustrate the sum the public is willing to pay to participate in this form of outdoor recreation.

Costs of fishing could be figured on an hourly basis, but, as the fish to be taken furnish the incentive for expenditures in special equipment and travel, as well as time, it is more expedient to assign these costs to the individual fish or the pounds of fish that are caught.

The pursuit of certain kinds of game fishes requires (according to expert advice) certain kinds of tackle, some kinds more expensive than others. Some of these fish are widely distributed and others are restricted in range, so that their pursuit involves a great variation in travel and related expense. Finally, game fishes vary in abundance and in wariness, so that the time element (time required to catch one fish or 1 pound of fish) is a important consideration in figuring costs.

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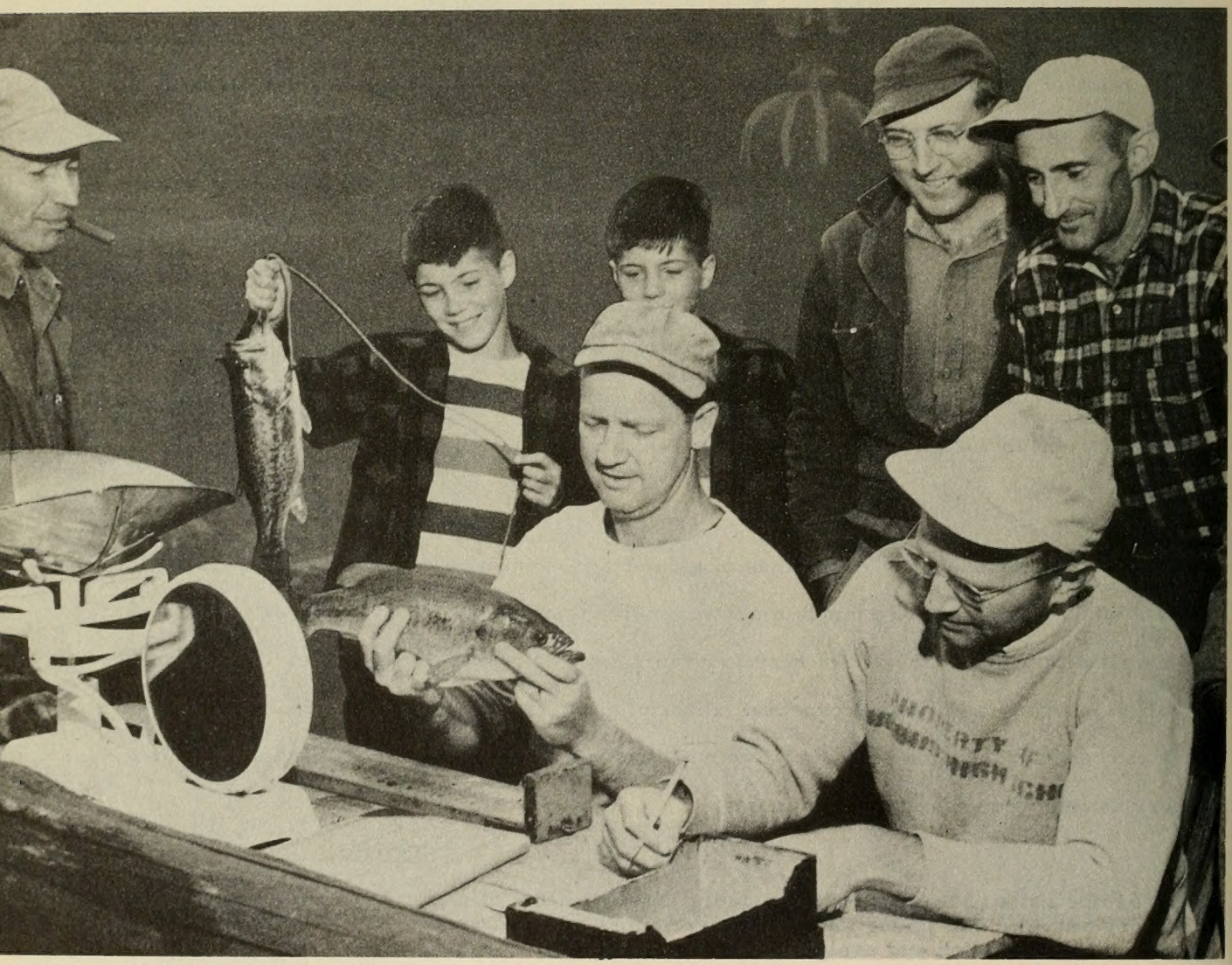
The largemouth bass, because of its wide distribution in lakes and sluggish rivers throughout Illinois, is considered by many as our most important game fish. Various figures have been used to represent the recreational value of (cost of catching) a pound of bass. In a recent paper, Bellrose & Rollings (1949) describe wildlife and fishery values of some bottomland lakes along the Illinois and Mississippi rivers. In this paper they use a recreational value, furnished to them by us, of $2.50 per pound for largemouth. This value was derived from rather meager data on the time required to catch a pound of this species. Since this estimate was made, the United States Fish and Wildlife Service in its Manual of Instructions, River Basin Studies, has used a value of $2.00 per pound as the estimated recreational value of bass.



Weighting and measuring the catch is part of Illinois Natural History Survey research at Ridge Lake.

Aerial view of Ridge Lake, showing dam and spillway in foreground.

A careful estimate of the cost of bass fishing in Illinois was obtained at Ridge Lake, Fox Ridge State Park, Coles County, Illinois, in 1949. In that year, the lake contained a large known population of bass and essentially no other fish and was fished by the public under a permit system designed to allow the recording of complete information on the catch--individual lengths, weights of fish, hours of fishing, and baits. Fishermen knew that only bass might be caught there; so all angling was for that species.

Three fishermen and their catch on the 1949 opening day at Ridge Lake.

BASS POPULATION AND RATE OF CATCH

At Ridge Lake, experiments in largemouth bass management have been in progress since 1941. This 18-acre artificial impoundment, which is about 7 miles south of Charleston, is opened to the public for fishing under a permit system developed to allow a complete inventory of all fish caught. In the early spring of every other year the lake is drained, and the fish are taken from the lake, counted, and weighed. Some water is then allowed to collect behind the dam, and fish (bass and sometimes other species) large enough to be caught by anglers are marked and returned to the lake. The lake basin usually is full again by the opening of the bass season in June.

In 1949, the lake was drained in March and a population of bass and bluegills was removed and censused. Following the census, 1,027 marked bass were returned to the lake, but the bluegils were not. Rainfall was subnormal during the spring months of 1949, and by June 1 the water level of the lake was up only to the 11-acre contour. Thus, all of the larger bass that had developed in 18 acres of water were concentrated in an 11-acre lake; the population density per acre was about 93 bass weighing 73 pounds. Also, one of the important sources of bass food, the bluegill population, had been eliminated. Conditions seemed optimum for excellent bass fishing.

In test fishing operations from June 1 to June 14, Natural History Survey personnel caught 50 bass weighing 52.5 pounds in 17 hours, 45 minutes. This catch gave a calculated average rate of one bass per 24 minutes of fishing or 1 pound of bass per 18 minutes. The lake was opened to public fishing on June 15. Once a concentration of fishermen appeared on the lake, the bass quickly became wary, and the catch rate dropped from a high rate early in the first day of public fishing to a much lower rate before the end of the day. The rate for the day was only one bass per 2.3 hours. The catch rates for the second to fifth days, inclusive, were one bass per 5.6, 14.3, 10.0, and 11.1 hours, respectively. Fishing improved somewhat during July, but never was better than an average of one fish per 5 hours for any week.

The reduced rate of catch which began at Ridge Lake before the end of the first day of the open season, after less than 10 man-hours of fishing per acre, is believed to represent a normal response of bass to intensive fishing. A marked drop in catch rate has occurred before the end of the first day of fishing in every year of fishing at Ridge Lake and

at other small lakes where opening-day fishing has been heavy. Apparently, bass that survive the first few hours of fishing become wary after exposure to even moderate fishing pressure.

At the end of the 1949 fishing season (September 1) the total catch at Ridge Lake was 594 bass weighing 540.5 pounds (49.1 pounds per acre). Fishermen had spent 3,949 hours in catching these bass, at an average rate of 0.15 fish per man-hour (one per 6.7 hours) or of 0.14 pound per man-hour (1 pound per 7.1 hours). The authors believe that these rates of catch may be better than those prevailing on many lakes because (1) the population of bass, in number of catchable fish per acre, was larger than is present in most lakes and (2) the natural supply of food for these fish had been greatly reduced at the time of lake draining.

FISHING COSTS QUESTIONNAIRE

A questionnaire was prepared and sent to 344 fishermen who had made reservations for boats at Ridge Lake in 1949. The questionnaire provided spaces to be filled in on number and cost of rods, reels, lines, baits, tackle boxes, leaders and hooks, boots, special fishing clothes, boats, motors, miscellaneous gear used in fishing, and annual replacement of lost baits and other equipment. It also provided spaces for stating the number and average distance of short, local fishing trips taken per year, and the number and average distance of long trips (300 miles or more round-trip) taken per year; average number of persons going with driver on short and long trips; length of time spent on long trips, average costs of food and lodging on long trips, kinds and poundages of fish caught, and extra costs such as guide service and boat rentals.

Of approximately 165 replies to the questionnaire, 126 were complete and contained the desired fishing costs information.

VALIDITY OF THE SAMPLE

A tabulation of the catch data on the creel cards of the 126 fishermen who completed the questionnaire shows that these fishermen caught 34.5 per cent (by weight) of the 1949 bass catch at Ridge Lake in 34.6 per cent of the total man-hours of fishing. Man-hours, numbers and weights of bass caught, and numbers and pounds of bass per man-hour for all fishermen

and for the sample of fishermen are shown in table 1. Fishermen in the sample who fished Ridge Lake more than four times were more successful than those who fished from one to

Table 1.--The 1949 catch rate of all fishermen at Ridge Lake and the catch rate of the sample of fishermen who filled out the fishing-cost questionnaire.

Fishermen	Total Man-Hours of Fishing	Number of Bass Caught	Weight of Bass Caught, Pounds	Number of Bass Caught Per Man-Hour	Weight of Bass Caught Per Man-Hour, Pounds
All	3,949	594	540.5	0.15	0.14
Those answering questionnaire					
Fishing 1 to 4 times	731.75	68	66.28	0.09	0.09
Fishing 5 or more times	633.00	150	120.27	0.24	0.19
Total	1,364.75	218	186.55	---	---
Average	---	---	---	0.16	0.14

four times, but when the two groups were combined their rate of catch was only 0.01 of a bass per man-hour higher than that for all fishermen, and the poundage rate was identical. Therefore, the sample was considered to be fairly representative of the entire group.

DETAILED COSTS

The costs that have been assigned to bass fishing at Ridge Lake in 1949 are as follows: cost of travel, cost of meals for those who drove relatively long distances, cost of fishing licenses, and the amortized cost of fishing tackle and other equipment, which would be the same no matter where fishing was done. Not included in the following analysis are such cost items as boat rentals (boats are furnished at Ridge Lake without charge), live baits, and refreshments, which may be purchased in Fox Ridge State Park.

Amortized costs of equipment.---Costs of fishing tackle and other equipment were amortized over an estimated period of usefulness as shown in table 2.

The amortized annual costs for all equipment items of the 126 fishermen were added together and divided by 126 to give the average cost per fisherman per year. Some

items, such as spinning rods and reels, were owned by only a few reporting fishermen, and the annual cost per fisherman was only 5 cents for spinning rods and 4 cents for spinning reels.

Table 2.--Average amortized costs of fishing equipment of 126 fishermen at Ridge Lake, 1949.

Item	Estimated Period of Usefulness	Annual Cost
Flyrods	12 years	$ 1.33
Fly reels	12 years	0.58
Fly lines	2 years	2.05
Casting rods	12 years	1.66
Casting reels	12 years	1.67
Casting lines	2 years	2.27
Spinning rods	12 years	0.05
Spinning reels	12 years	0.04
Spinning lines	2 years	0.07
Flyrod lures	2 years	4.65
Casting lures	5 years	4.28
Spinning lures	3 years	0.09
Tackle boxes	7 years	0.97
Leaders and hooks	2 years	1.54
Boots	4 years	1.63
Special fishing clothes	4 years	1.02
Boats	10 years	3.08
Outboard motors	6 years	6.26
Anchors and miscellaneous	7 and 5 years	0.07
Additional baits and gadgets	1 year	6.09
Total	- - - - - - - - -	$39.40

The item "additional baits and gadgets" represents the annual cost of replacing lost baits and other equipment and adding new baits. The figure for this item is the average of the estimates given in the questionnaires and probably is too low. The sum of the amortized costs, $39.40, represents the average annual equipment costs per fisherman. This figure was divided by the average number of short fishing trips taken (not necessarily to Ridge Lake) by the fishermen in the sample, to give the cost of equipment per trip. Only short trips were included in the calculation because most long trips (usually to northern lakes) were family affairs not primarily for fishing but to escape warm weather. For such trips, separating the costs that could be allocated to fishing was next to impossible.

A 3.1 pound bass and its captor. The fish was caught at Ridge Lake in 1949.

The 126 fishermen varied in the number of short trips taken from 2 to 102 for the 1949 season; the average for all was 24.78. This group probably was unusual in the high average number of fishing trips, which made the amortized cost of equipment per trip very low, $1.59:

$$\frac{39.40}{24.78} = \$1.59$$

The average fishing time per trip at Ridge Lake was found to be 3.4 hours. On this basis, the average cost of equipment per hour of fishing at Ridge Lake was 47 cents:

$$\frac{1.59}{3.40} = 0.47$$

Cost of travel.---The road distance in miles traveled to and from Ridge Lake was figured for each of the 126 fishermen, and, in the cases where individuals fished the lake more than once, their mileages were multiplied by the number of trips they made to this lake.

The sum of individual trip-miles for the sample group was 25,371.2. However, as fishermen usually made boat reservations in pairs and traveled in pairs to fish Ridge Lake, the individual mileage figure was divided by 2, giving a figure of 12,685.6 from which to calculate costs. This mileage represented 404 trips.

Thus, $\frac{12,685.9}{404} = 31.4$, the average number of miles traveled per trip, representing a cost, on the basis of 7 cents per mile, of 31.4 x 0.07, or $2.20 per trip.

The average length of time fished per trip was 3.4 hours. Therefore, the travel cost per hour of fishing was as follows:

$$\frac{2.20}{3.40} = 0.647, \text{ or } 65 \text{ cents}$$

Cost of meals.---Many of the fishermen came from Charleston, the nearest large town, 7 miles north of Ridge Lake, or from towns within a road distance of less than 50 miles from the park. It was assumed that these fishermen probably spent little or nothing for meals. Those who traveled a road distance of 50 miles or more to reach the lake (100 miles or more round-trip) probably stopped for meals along the way. An arbitrary distance-meal relationship was set up for individual fishermen as follows:

100-150 miles, round trip ..... 1 meal

151-225 miles, round trip ..... 2 meals

226 or more miles, round trip ..... 3 meals

Meals were assigned to individual fishermen on this arbitrary basis, giving a total for the season of 140 at an assumed average cost of $0.75 each, for a total cost of $105.00.

On the basis of 404 trips, the cost per trip was 26 cents:

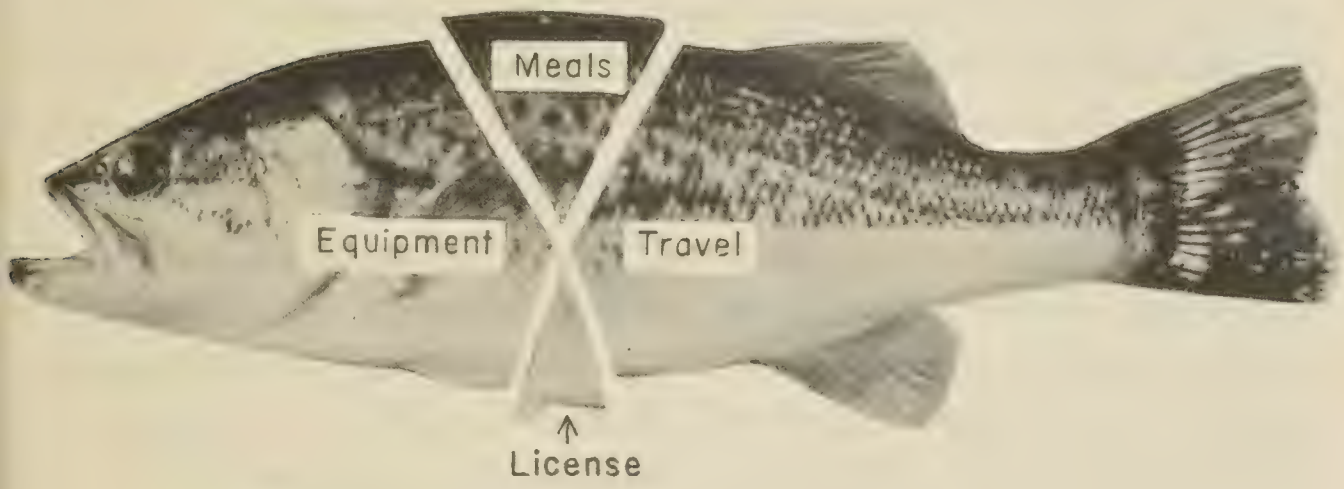
$$\frac{105}{404} = 0.26$$

The cost of meals per hour of fishing was 8 cents:

$$\frac{0.26}{3.40} = 0.08$$

Total costs.---An approximation of the total costs of bass fishing at Ridge Lake in 1949 was as follows:

Cost of license per hour of fishing	$0.02
Cost of equipment per hour of fishing	0.47
Cost of travel per hour of fishing	0.65
Cost of meals per hour of fishing	0.08
Total cost per hour of fishing	$1.22



The calculated cost of catching a pound of largemouth bass at Ridge Lake in 1949 amounted to $8.66: 53.2 per cent for travel, 38.6 per cent for equipment, 6.6 per cent for meals, 1.6 per cent for license.

This average cost per hour of fishing multiplied by the average time required to catch a pound of bass in Ridge Lake in 1949 (7.1 hours) gave $8.66 as the average cost of catching a pound of bass:

$$1.22 \times 7.1 = 8.66$$

The addition of a boat rental charge of $1.00 per day would raise the cost of catching a pound of bass to $9.70 (3.4-hour day; two men per boat):

$$\frac{7.1 \times 1}{3.4 \times 2} = 1.04$$

$$\$8.66 + \$1.04 = \$9.70$$

DISCUSSION

Largemouth bass fishing at Ridge Lake is principally a local undertaking; thus, travel costs that can be assigned to it are considerably less than can be assigned to fishing in areas of resort development.

Obviously, a key item in the demonstrated high cost of fishing for largemouth bass is the average length of time required to catch a pound of this species. Many fishermen, when confronted with the rate of catch recorded for Ridge Lake, will claim that bass fishing must be considered poor there, and that this rate cannot possibly represent their own experience. It must be borne in mind, however, that these calculations include all of the unproductive hours as well as the hours that produced fish; human nature being as it is, many fishermen forget the times they have come home empty handed and remember only those times they caught fish. Actually the catch rate at Ridge Lake in 1949 may have been higher than in most Illinois waters because (1) the population of legal-sized bass returned to the lake after the March census was larger than is found in most waters of the state and (2) when the bass were returned to the lake the population was concentrated by low water levels; moreover, (3) bass food, in the form of small bluegills, was nearly eliminated in March, shortly before the fishing season.

The sudden drop in the catch rate after heavy fishing started indicates to the authors that bass become aware, in some way yet unknown, of the danger of striking baits attached to a line. These fish become wary of natural baits (live crayfish and minnows) as well as artificials (Durham & Bennett 1949). Actually the catch rate for the 1949 season averaged higher for some artificial baits than for either live minnows or live crayfish.

A comparison of the rates of catch during preseason and open-season fishing for other years at Ridge Lake shows a similar drop in catch rate beginning with the onset of heavy angling. In 1944 the lake was not opened to public fishing until August because, previous to that time, the brood of bass then dominant averaged less than 10 inches in length. Samples of this brood caught by Natural History Survey personnel during May, June, and July were taken at a very high rate per hour, but as soon as the lake was opened to the public the catch rate became very low.

No exact figures are available on the amount of fishing that may be done before bass become wary, nor on the "rest" period necessary before these fish lose their wariness. During

the 1946 fishing season, the lake was closed for 2 weeks to allow the bass to "forget," but the catch rate was no better after the rest period. Whether a period of 1 or 2 months free from fishing is sufficient to cause bass to lose their wariness is not known, because little fishing has been done at Ridge Lake in late September and early October after the lake has been fished heavily during June, July, and August. However, by the spring following a season of heavy fishing the bass seem to have lost their wariness.

Individual catch records of fishermen who fished Ridge Lake five or more times during 1949 indicate that some fishermen are much more skillful than others in catching bass. One man who fished the lake 14 times during the season had an average catch rate of 1 pound of bass per 1.76 hours; another who fished the lake 11 times caught bass at the rate of 1 pound per 1.92 hours. Both of these seasonal rates were better than the average rate of all fishermen on the opening day. Still another fisherman who fished the lake 20 times had a catch rate of 1 pound of bass per 11.1 hours, a poor rate as compared to the season average. This fisherman apparently was unable to develop a satisfactory technique for inducing bass to strike.

Most of the experienced bass fishermen who fished Ridge Lake more than once were enthusiastic regarding the catches made there. Inexperienced local anglers who made poor catches were satisfied because they had been unable to do as well elsewhere and they appreciated the opportunity of having a place to fish within a reasonable driving distance. It is quite probable that a number of fishermen who drove 150 to 250 miles to fish and went away empty handed were dissatisfied. Because of the uncertainty of bass fishing, no attempt has been made to advertise the lake other than to publish records of unusual catches and to announce the opening dates in the newspapers of nearby towns and cities.

For reasons mentioned previously, the authors believe that the cost of $8.66 per pound of bass taken in Ridge Lake in 1949 is low for bass fishing in Illinois. A pound of bass from most lakes in Illinois might cost from $10 to $15. Yet many more sportsmen would purchase fishing equipment and willingly pay other costs if satisfactory bass fishing were available.

If bass fishing has a recreational value equal to the costs involved, the crop of bass produced by Ridge Lake in 1949 (540.5 pounds) was worth $4,680.73; equivalent to $260.04 per acre on the basis of a full lake (18 acres) and $425.52 per acre on the basis of the lake as it was in the summer of 1949 (11 acres).

If we may assume that the cost of bass fishing and rate of catch (but not the man-hours of fishing or total catch) have been nearly constant at Ridge Lake throughout the 7 years the lake has been opened to public fishing, the total value of the recorded bass catch was $20,424.18. This sum is equivalent to $2,917.74 per year or $162.10 per acre per year (18 acres assumed as the average area of the lake). In addition to bass, 1,163.6 pounds of bluegills were taken in the years 1946-1948, inclusive.

SUMMARY

1. In 1949, Ridge Lake contained a largemouth bass population having a per acre average of 93 fish weighing about 73 pounds. The lake was opened to public fishing during June, July, and August, and fishermen caught 540.5 pounds (49.1 pounds per acre) at the average rate of 1 pound per 7.1 hours of fishing. The catch rate dropped from a high rate early in the first day of public fishing to a much lower rate before the end of the day; it remained low through August in spite of the fact that the bass were crowded and their food supply reduced.

2. A questionnaire sent to 344 Ridge Lake fishermen was completely answered by 126. These men spent an average of $1.22 per hour to fish Ridge Lake and caught bass at approximately the same rate as did all fishermen who fished this lake. Costs included amortized cost of tackle and other equipment, $0.47 per hour; travel, $0.65 per hour; meals, $0.08 per hour; and fishing license, $0.02 per hour. Based on the cost figures per hour of fishing (exclusive of boat rental), the average expense of catching a pound of bass was $8.66.

3. If bass have a recreational value equal to the costs involved in catching them, the bass crop produced by Ridge Lake in the 7 years of fishing there had an average annual value of $162.10 per acre of lake.

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